Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (previously presented) A magnetic resonance imaging apparatus for imaging a selected portion of a subject placed in a static magnetic field, said magnetic resonance imaging apparatus comprising RF transmitting means for applying an RF excitation pulse to said subject, an RF irradiation control means for controlling irradiation phase of the RF excitation pulse, RF receiving means for detecting nuclear magnetic resonance signals generated from the subject, a control means for controlling the RF transmitting means, the RF irradiation control means and the RF receiving means, and an image formation means for reconstructing an image of said selected portion of the subject by using the nuclear magnetic resonance signals,

said RF transmitting means including a first coil and one or more additional coils,

wherein the RF irradiation control means controls RF irradiation so that the RF excitation pulse is simultaneously applied to each of said first coil and said one or more additional coils such that a phase of a second half of a waveform of an output of at least one of said one or more additional coils, after the temporal center of the RF excitation pulse, is different by 180° from a phase of the first half of the waveform, such that excitation is selectively applied only to a local region.

2. (previously presented) The magnetic resonance imaging apparatus according to claim 1, wherein the RF transmitting means is provided with a multiple array RF transmitting coil comprising multiple RF coils of different sensitivity profiles, and the RF irradiation control

means performs such phase control for a part of the multiple RF coils that the phase of the second half of the RF pulse waveform after the temporal center thereof should be different by 180° from the phase of the first half of the RF pulse waveform.

3. (previously presented) The magnetic resonance imaging apparatus according to claim 2, wherein the multiple array RF transmitting coil is provided with a RF loop coil and at least one RF differential coil, the RF differential coil is provided with multiple RF subloop coils, the multiple RF subloop coils and the RF loop coil have a common central axis, the RF subloop coils are plane-symmetrically disposed around the RF loop coil as the center, and the RF subloop coils constituting the same RF differential coil are connected so that currents should flow through a pair of plane-symmetrically disposed RF subloop coils in different directions.

4. (previously presented) The magnetic resonance imaging apparatus according to claim 3, wherein the RF differential coil is provided with a primary RF differential coil and a secondary RF differential coil, the RF subloop coils of the primary RF differential coil are disposed so that the RF loop coil should locate between the RF subloop coils of the primary RF differential coil, and the RF subloop coils of the secondary RF differential coil are disposed so that the RF loop coil and the RF subloop coils of the primary RF differential coil should locate between the RF subloop coils of the secondary RF differential coil.

5. (previously presented) The magnetic resonance imaging apparatus according to claim 2, wherein the RF transmitting means is provided with, as RF transmitting coils, a first multiple array RF transmitting coil comprising a first RF loop coil and at least one RF differential coil

having a common central axis and a second multiple array RF transmitting coil comprising a second RF loop coil and at least one RF differential coil having a common central axis, and the central axes of the first and second multiple array RF transmitting coil are perpendicular to each other.

6. (previously presented) The magnetic resonance imaging apparatus according to claim 3, wherein the RF loop coil comprises plane-symmetrically disposed multiple RF loop coils.

7. (previously presented) The magnetic resonance imaging apparatus according to claim 3, wherein the RF irradiation control means performs such phase control for the RF differential coil among the multiple RF coils that the phase of the second half of the RF pulse waveform after the temporal center thereof should be different by 180° from the phase of the first half of the RF pulse waveform.

8. (previously presented) The magnetic resonance imaging apparatus according to claim 7, wherein the RF irradiation control means performs such phase control for the RF differential coil that the phase should be inverse in two times of measurement, and the image formation means adds nuclear magnetic resonance signals obtained by two times of the measurement to reconstruct one image.

9. (previously presented) The magnetic resonance imaging apparatus according to claim 1, wherein the control means performs selective excitation for the slice direction upon excitation by application of the RF magnetic field.

10. (previously presented) The magnetic resonance imaging apparatus according to claim 1, wherein the control means performs selective excitation for the phase encoding direction or frequency encoding direction upon excitation by application of the RF magnetic field.

11. (previously presented) The magnetic resonance imaging apparatus according to claim 3, wherein the multiple array RF transmitting coil is used also as an RF receiving coil of the RF receiving means.

12. (previously presented) The magnetic resonance imaging apparatus according to claim 11, wherein the control means performs imaging with thinning out the phase encoding, and when an image is reconstructed by using nuclear magnetic resonance signals detected by each of the coils of the multiple array RF transmitting coil, the image formation means performs an anti-aliasing operation by using sensitivity profile of each of the coils constituting the multiple array RF transmitting coil.

13. (previously presented) The magnetic resonance imaging apparatus according to claim 11, wherein the image formation means composes images reconstructed by using nuclear magnetic resonance signals detected by each of the coils of the multiple array RF transmitting coil to produce one image.

14. (new) The magnetic resonance imaging apparatus according to claim 1, wherein the RF excitation pulse is applied without a slice selection gradient magnetic field being applied

simultaneously.

15. (new) The magnetic resonance imaging apparatus according to claim 1, wherein said first coil operates independently, and is decoupled, from said additional coils.

16. (new) The magnetic resonance imaging apparatus according to claim 1, wherein said additional coils are differential coils configured such that when the RF excitation pulse is simultaneously applied to each of said first coil and said additional coils, the phase of the first half of the waveform of the output of said additional coils is the same as a phase of a waveform of an output of said first coil, and the phase of the second half of the waveform of the output of said additional coils is different by 180° from the phase of the waveform of the output of said first coil.

17. (new) A magnetic resonance imaging apparatus for imaging a selected portion of a subject placed in a static magnetic field, said magnetic resonance imaging apparatus comprising:

an RF transmission section configured to apply an RF excitation pulse through a first coil and one or more additional coils to said subject;

RF receiving means configured to detect nuclear magnetic resonance signals generated from the subject,

a control section configured to control irradiation phase of the RF excitation pulse and control the RF transmission section and the RF receiving means, and

a signal processing section configured to reconstruct an image of said selected portion of the subject by using the nuclear magnetic resonance signals,

wherein the control section controls RF irradiation so that the RF excitation pulse is

simultaneously applied to each of said first coil and said one or more additional coils such that a phase of a second half of a waveform of an output of at least one of said one or more additional coils, after the temporal center of the RF excitation pulse, is different by 180^0 from a phase of the first half of the waveform, such that excitation is selectively applied only to a local region.